NRCS Natural Resources Conservation Service

Fish Passage

WV Conservation Practice Job Sheet *Code 396*

DEFINITION

Modification or removal of barriers that restrict or prevent movement or migration of fish.

PURPOSES

Provide upstream and downstream movement of fish past barriers where feasible or desirable.

WHERE USED

Fish passage is an extremely complex and often controversial practice. This practice should never be attempted without proper training and experience.

This practice applies to all waterbodies where barriers impede desired fish passage. Fish passage barriers can be *natural* (e.g., waterfalls, beaver dams) or *artificial* (e.g., road culverts, surface water diversions or dams). Native fish have evolved around the presence of natural barriers – they should be left in place. Beaver dams, for example, may block weak-swimming fish at all flows or strong swimmers during only extreme flows, yet they create very diverse habitat for fish and numerous other species of aquatic and terrestrial wildlife.

When feasible, artificial barriers should be completely removed or the stream should be rerouted around them to avoid installing expensive, high-maintenance aquatic life passage structures (fish ladders). However, for some surface-water diversion dams or weirs, a fish ladder may be the only alternative. A concurrent "passage" problem at these diversion structures is the loss of fish that become entrained in the diverted flow. This problem is best addressed by installing screens.

This practice is commonly applied concurrently with (395) Stream Habitat Improvement and Management as part of a resource management system for a conservation management unit.

Often, artificial barriers (especially culverts) are associated with unstable stream conditions. When this occurs, this practice should be part of a long-range goal to restore stability to the entire watercourse. Other facilitating practices to achieve this goal may be with (584) Channel Stabilization and (580) Streambank and Shoreline Protection.

Structures installed under this practice must be designed not only for upstream passage of fish, but also for downstream passage of high flows, bedload, and woody debris.

CRITERIA

Road crossing structures installed under this practice must be designed not only for upstream and downstream passage of fish and aquatic organisms, but also for passage of high flows, bed-load, woody debris, and wildlife.

The ability to negotiate instream obstructions varies by species and by size of individual fish within a species.

Additional criteria may be required by agencies for fish that are protected.

Maximum velocities for upstream passage are based on the prolonged swimming speed (medium energy, sustainability in minutes) of the target fish. Passage should be designed for the weakest fish in the system.

CULVERTS THAT PROVIDE AQUATIC LIFE PASSAGE

The volume of fill for culverted structures is limited to the amount required to achieve transportation purposes.

Culverts shall be installed on the same slope as the streambed where practical and must completely span the bankfull channel.

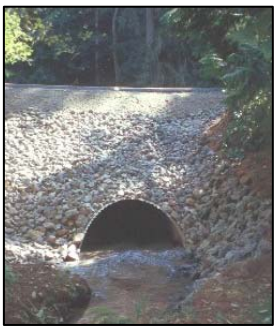
The inlet/outlets must be designed in such a manner to maintain substrate in the bottom of the culvert (culverts installed in bedrock do not need to be countersunk). Countersinking the culvert in to the sub-pavement of the streambed or the use of a bottomless culvert (is preferred) and will satisfy this requirement.

If fills associated with the crossing extend into the floodplain, the use of floodplain culverts will be utilized where practical.

SPECIFICATIONS

Specifications may be provided on this job sheet or separately using site-specific specification sheets and engineering design specifications. Specifications are prepared in accordance with the NRCS Field Office Technical Guide and Practice Standard (396) Fish Passage.

Impassable 36” round culvert; 18” outlet drop; 66” bankfull width



Replaced with embedded 98” x 45” bottomless pipe arch

OPERATION AND MAINTENANCE

Requirements associated with fish passage projects are:

- Inspection of the integrity of fences, access roads, water access, crossings and other livestock control measures. Replace or repair as necessary.
- Inspection of the structure at regular intervals to ensure it is operating within design criteria.
- Cleaning of trashracks and debris collectors regularly.
- Adjustment of gates, orifices, valves, or other control devices as needed to regulate flow and maintain a passage structure within operating criteria.
- Periodic check of staff gages or other flow metering devices for accuracy.
- Annual inspection of passage structures for structural integrity and disrepair including worn or broken stop logs, baffles, fins, or other structural components. Immediately repair any vandalism, vehicular, or livestock damage.
- Inspection of gate(s) and seals for damage;
- Removal of sediment accumulations from within passage structure where applicable.
- The inspection of any bank or channel measures should be conducted during low-water conditions to allow viewing of the measure as well as changes to the stream bed that may affect future integrity of the system.
- Any routine maintenance of vegetation which includes removal of hazardous trees and branches that threaten safety, buildings, fences, as well as vegetation along road shoulders, trails and similar features. Maintain vigorous growth of desirable vegetative coverings. This includes reseeding and controlled application of herbicides when necessary. Periodic mowing may also be needed to control height of vegetation.
- Inspect for damage from rodents or burrowing animals. Repair any damage. Take appropriate corrective actions to alleviate further damage.
- Maintain stream bank protection facilities, i.e. weirs, riprap, rock barbs, log revetments, etc.
- Maintain safety measures for protection of people and animals.

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ENVIRONMENTAL COMPLIANCE

Potential requirements associated with fish passage projects are:

A. United States Army Corps of Engineers (USACE) Pittsburgh or Huntington District

Clean Water Act Section 404 - Discharge of dredged or fill material into waters of the U.S. is prohibited unless the action is exempted or is authorized by a permit issued by the U.S. Army Corps of Engineers.

Dam retrofitted with pool-and-weir fishway.

B. United States Fish and Wildlife Service (USFWS) Endangered Species Act of 1973 - authorized the Secretaries of Interior to classify those plants or animals, which the Secretary of the Interior deems as "endangered" or "threatened" based on the best available scientific and commercial data. Consultation with USFWS may be required in areas of concern for threatened and/or endangered habitat.

D. West Virginia Division of Natural Resources (WVDNR) –

West Virginia Public Lands Corporation Right of Entry (PLC) - The PLC issues licenses and charged annual fees for utilities, wharfs, bridges and other structures and easements in the public streambeds and banks.

Section 401 Water Quality Certification - see WVDEP below. Field support for the 401 program is provided by the WV Division of Natural Resources' Wildlife Resources Section (WVDNR).

The West Virginia Wildlife Diversity Program (WDP) - conserves the State's non-game wildlife and their habitats and conducts ongoing statewide ecological inventory of rare plant and animal species, wetlands and other ecological communities. The WDP works closely with the U.S. Fish and Wildlife Service (USFWS) to monitor the status of the State's rare, threatened and endangered plants. Projects that affect certain streams containing protected habitats require notification and coordination with WDP. Detailed project information concerning location and description of projects should be submitted for review at least 30 days prior to implementation.

E. West Virginia Department of Environmental Protection (WVDEP) – Division of Water and Waste Management/Permitting and Engineering Branch

Section 401 Water Quality Certification - required for each permit or license issued by a federal agency to ensure that proposed projects will not violate the state's water quality standards or stream designated uses. States are authorized to issue Certification under Section 401 of the Federal Clean Water Act.

The West Virginia Dam Control Act (DCA) - charges the WVDEP with regulating dams. A dam is defined as: "any artificial barrier with specific impounding capacities and height specifications". It is illegal to place, construct, enlarge, alter, repair, remove, or abandon a dam without a certificate of approval from WVDEP.

National Pollutant Discharge Elimination System (NPDES) – This is a national program under Section 402 of the Clean Water Act for regulation of discharges of pollutants from point sources to waters of the United States. Discharges are illegal unless authorized by an NPDES permit.

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Specifications

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Site-specific requirements are listed on the specification sheet. Additional provisions are entered on the job sketch sheet. Specifications are prepared in accordance with the NRCS Field Office Technical Guide and the Fish Passage practice standard (396). Information on this job sheet is considered to be part of the conservation plan.

Client:	**Farm #:**	**County:**
Field(s):	**Tract #:**	**Stream**
Designed By:	**Date:**	**8 Digit HUC #**

Aquatic Biologist:	**Partner NGO:**
Hydrologist/Engineer:	**Fluvial Geomorphologist:**
Environmental Specialist:	**Other:**

Purpose (check all that apply)	
☐ Provide aquatic life passage via culvert installation	☐ Provide aquatic life passage via removal of barrier(s)
☐ Provide aquatic life passage via installation of a structure (fish ladder, etc)	☐ Other (explain)_____

Layout					
Stream Type & Geodetic Datum	**Stream Type / Classification System** _____	**Drainage Area** (ac) _____	**Approx. Bankfull Width** (ft) _____	**Site#:**	☐ Warm Water Stream ☐ Cold Water Stream
				Site#:	☐ Warm Water Stream ☐ Cold Water Stream
Assessment Method Used	Multi-Discipline Assessment (e.g. written/design files, EA's, etc.)				
	Passage Through Crossing Assessment (National Inventory and Assessment Procedure)				
	Attach stream longitudinal profiles and upstream and downstream cross sections, as needed.				
Target Species Characteristics	☐ Brook Trout ☐ American Eel ☐ Other:_____			**Targeted swimming speed** (mph) _____	**Leaping ability** (ft) _____

General Site Concerns (check all that apply)	☐ Road Failure	☐ Bed Scour	☐ Beaver Dam
	☐ Road Approach	☐ Sediment Deposition	☐ Loss of Diversion Flow
	☐ Road Failure	☐ Bank Erosion	☐ Lack of Riparian Zone
	☐ Structure Failure	☐ Excessive Bank Erosion	☐ Inadequate Road Fill
	☐ Channel modification (avulsion, straightening, etc.)	☐ Inadequate Bank Stabilization	☐ Other (see notes below)
Layout Notes	Additional Comments:		

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Barrier Description – Complete as applicable

Type:

- ☐ **Partial**—impassable to some species or certain age classes all or most of the time
- ☐ **Temporary**—impassable during some times to all or most species and/or age classes (*e.g.,* during high or low flow conditions)
- ☐ **Complete**—impassable to all fish at all times

Site #(s)

Construction Materials:

Dimensions	**Length**	**Width**	**Height**
	(ft)	(ft)	(ft)

Barrier(s) Lat. & Long. (if applicable)

_____ °N
_____ °E

_____ °N
_____ °E

Approximate Construction Date of Barrier (if anthropogenic)

Number of Barriers:

Topographic Quad:

Listed as a barrier by:

Miles to next barrier (if known)

A. Culvert(s) - For multiple culverts additional sheets may be required or use the additional notes section. *(Complete as applicable)*

Number	**Shape**[1]	**Material**[2]	**Width**	**Rise**	**Length**	**% Slope**

Problem(s)

☐ Perched	☐ Impounded upstream	☐ Excessive water velocities
☐ Obstructed	☐ Collapsed	☐ Slope change (e.g. too steep)
☐ Rusted through	☐ Downstream deposition	☐ Upstream deposition
☐ Insufficiently sized	☐ Insufficient water depth	☐ Other (see notes in A or B. below)

Outlet invert is:

If embedded, fill depth is:

Water velocity (ft/sec):

Invert Elevations Inlet: Outlet:

Inlet angle to stream:

Outlet angle to stream:

Road Width (ft)

Overflow pipes present? ☐ **Yes** ☐ **No**

Channel avulsion – upstream (Where will over-bank water flow?)

Additional Notes:

[1] Shape= Arch, Box, Elliptical, Round, or Other.
[2] Material= Corrugated Steel, Corrugated Aluminum, Corrugated Plastic, Corrugated Composite, Smooth Plastic, Smooth Metal, Log/Wood, Smooth Plastic, Other

B. Culvert Solution - Fill in the information below as applicable, **or** if all the information below will be provided in engineering designs and specifications leave blank and check this box ☐.

Solution[1]	**Culvert Design**[2]	**Shape**[3]	**Material**[4]	**Span**	**Rise**	**Length**	**% Slope**

Culvert Elevation:		**24 hour Storm Event Design** (25 yr min)	**Downstream Bed Controls Type** [5]	**Upstream Bed Controls Type**[5]	**Retrofitted in Place**	**Weirs Installed:**	
Inlet						**Number**	
Outlet			_____ #____	_____ #____		**Material**	

Construction Window Restrictions (e.g. spawning season)

Additional Notes:

[1] Removal, New Culvert, Bridge
[2] No- Slope Culvert, Hydraulic Design Culvert, Stream Simulation Culvert
[3] Arch Culvert, Box Culvert, Elliptical, Round, Other
[4] Corrugated Steel, Corrugated Aluminum, Corrugated Plastic, Corrugated Composite, Smooth Plastic, Smooth Metal, Log/Wood, Concrete Smooth Plastic, Other
[5] Log, Rock

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C. Existing Dam(s)/Weir(s) - For multiple dams, additional sheets may be required or use the additional notes section. *(Complete as applicable)*

Construction/Form	Height (Specify Units)	Face	Base	Plunge Pool Depth (Specify Units)	Reservoir Depth (Specify Units)

Approx. Date of Construction	Additional Notes:

D. Dam(s)/Weir(s) Solution - Fill in the information below as applicable, **or** if **all** the information below will be provided in engineering designs and specifications leave blank and check this box ☐.

Construction Window Restrictions (e.g. spawning season)	Number of Weirs/Bed Controls		Fish Screens Needed
			☐ Yes ☐ No

Preferred Solution(s)	
	☐ Complete Removal of Barrier (refer to design)
	☐ Installation of Aquatic Life Passage Structure (ALPS) (complete E below)
	☐ Partial removal or modification of barrier (refer to design)
	☐ Installation of bottomless culvert
	☐ Other:_____

- Consider using the Vermont Stream Geomorphic Assessment Handbook, Appendix G datasheets for field assessment of bridges, arches and culverts.

E. Aquatic Life Passage Structure (ALPS) – Complete this section if an ALPS (*fish ladder*) is the preferred or recommended solution. Refer to specific engineering designs.

Type			
	☐ Denil Type	☐ Eel way	☐ Bypass Channel
	☐ Alaska Steeppass	☐ Rock Ramp	☐ Roughened Channel (with rock)
	☐ Pool and Weir	☐ Baffle Replacement/Renovation	☐ Roughened Channel (with logs)
	☐ Vertical Slot	☐ Lift	☐ Attraction Flow Improvement

If needed, an aerial view or a side view of the practice can be shown below. Other relevant information, complementary practices and measures, and additional specifications may be included

Additional Notes, Specifications, Operation and Maintenance Requirements, etc.

Follow the procedures and methods for Operation and Maintenance as outlined in this jobsheet and/or design. Additional Notes:

For more information concerning this practice contact:

_____ **at** _____